

RANGE EXPANSION OF *PANICUM REPENS* (POACEAE)
INTO CENTRAL TEXAS (U.S.A.) MAY THREATEN ENDANGERED SPECIES

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ABSTRACT

The westward range extension of the highly invasive aquatic grass, *Panicum repens* (torpedograss), in the San Marcos River, Hays County, Texas and its implications to listed species and critical habitat are reported. This range extension represents an increase of ca. 275 km linear distance west from Trinity County in eastern Texas Pineywoods to Hays County on the eastern edge of the Edwards Plateau and western margin of the Blackland Prairie ecoregions. It is likely that *P. repens* is not a recent, within the last 3–5 years, introduction into the San Marcos River because an area greater than 0.4 ha was observed on November 9, 2012, just below Cumming's Dam with smaller and scattered patches located downstream. The species ability to reproduce asexually and invade new areas makes it a severe threat to threatened and endangered species and their critical habitat within the upper San Marcos River.

RESUMEN

La extensión hacia el oeste de la hierba acuática muy invasiva, *Panicum repens* (torpedograss), en el Río San Marcos en el Condado Hays, Texas y sus implicaciones con otras especies son enumeradas y sus hábitats críticos están reportados. Esta expansión de rango representa un aumento de casi 275 km de distancia lineal hacia el oeste del Condado Trinity en el este de Texas hasta el Condado Hays en la parte oriental de la Meseta Edwards y el margen occidental de las ecoregiones Pradera Blackland. Es probable que *P. repens* no sea una introducción reciente, solamente en los últimos 3 a 5 años, en el Río San Marcos porque un área de más de 0.4 hectáreas fue observada el 9 de noviembre de 2012, justamente bajo la Represa Cummings con pequeñas partes dispersas río abajo. La habilidad de las especies para reproducirse asexualmente e invadir nuevas áreas crea una amenaza severa para las especies en peligro de extinción y sus hábitats críticos en el Río San Marcos.

***Panicum repens* L.**, torpedograss, is a C_4 grass native to Europe, Asia, and Africa (Hossian et al. 1999). The species is considered one of the world's most aggressive grass weeds in agriculture (Holm et al. 1977) and natural areas (Langeland et al. 2008). It is widely naturalized throughout the New World tropics and subtropics (Sutton 1996; Langeland et al. 2008). The species is currently distributed throughout the southeastern United States, California, and Hawaii (Langeland et al. 2008). In Texas, the species is documented from herbarium records in six counties (Cameron, Chambers, Galveston, Jefferson, Matagorda, and Trinity) in the eastern part of the state (Shaw et al. 2011; Shaw 2012). An additional voucher specimen of *P. repens* exists from Montgomery County (Roger W. Sanders 6283, TEX 00207360) and un-vouchered observations are recorded for Calhoun and Harris counties (Jason Singhurst, unpubl. data). It is listed as a noxious weed by the Texas Department of Agriculture (TDA 2013) and a prohibited exotic species by the Texas Parks and Wildlife Department (TPWD 2013).

The species is a perennial grass that can grow to heights of 1 meter. It is mat-forming in water spreading from an extensive network of rhizomes and stolons. The common name refers to the sharp-pointed torpedo-like tips of the rhizomes. *Panicum repens* is known to form extensive mats in water 0.6 to 1.2 meters deep, displacing native aquatic plants (Tarver 1979). Rhizomes and stolons can grow to lengths of 6 meters (Langeland 1998). The species invades a wide variety of habitats and can be found growing in aquatic, riparian, wetland, and terrestrial habitats in the southeastern United States, but thrives in wetland and riparian habitat. Its invasive potential is due to its ability to establish in new areas from short stem fragments, rhizomes, and stolons (Sartain 2003). Non-native grasses may have the ability to alter regional and even global aspects of ecosystem function (D'Antonio & Vitousek 1992). Being a C_4 grass, *P. repens* would have an advantage over native C_3

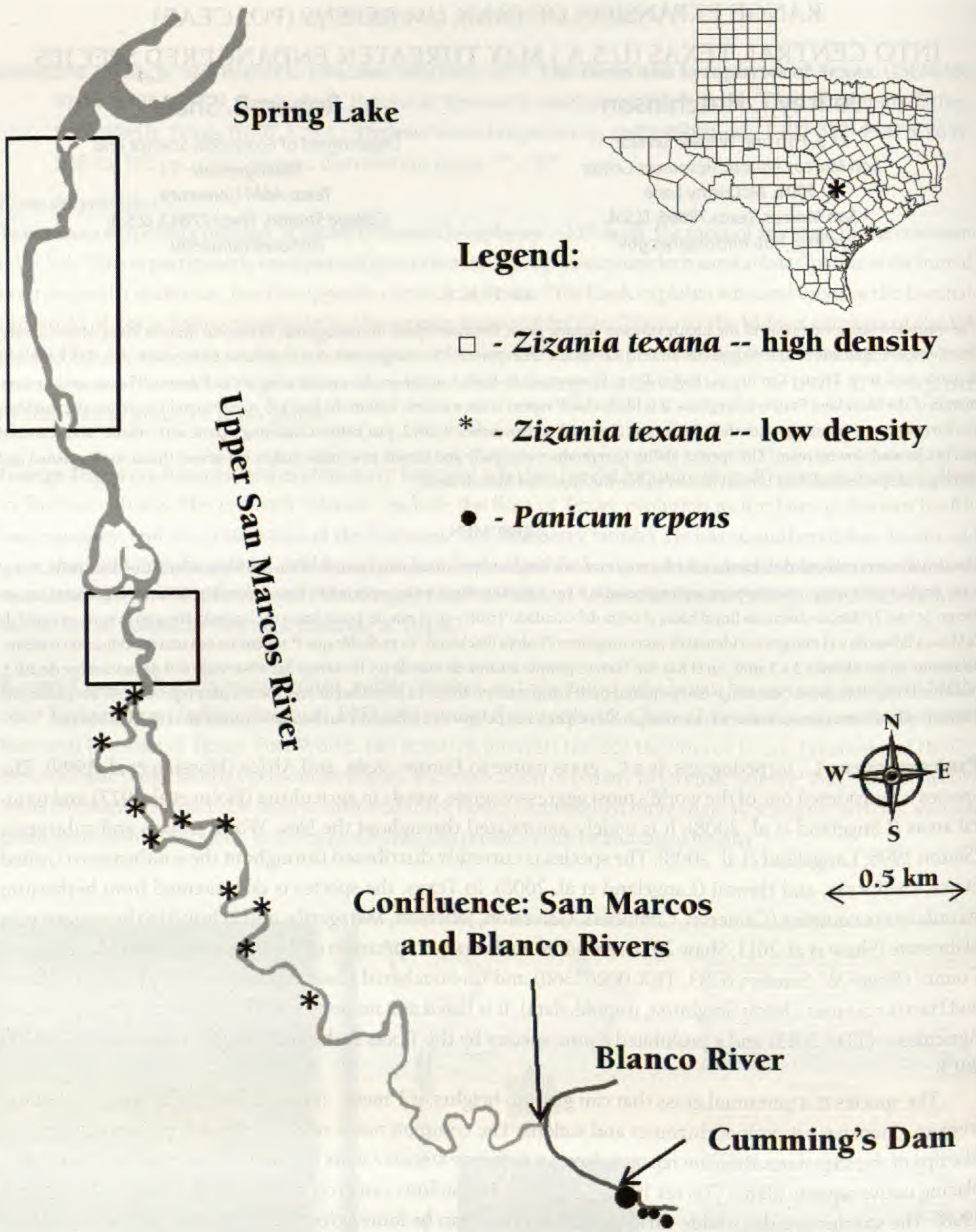


FIG. 1. Locations of the San Marcos River in relation to Texas and *Panicum repens* in the upper San Marcos River in relation to *Zizania texana*.

grasses, such as the endangered *Zizania texana* Hitch., by its ability to sequester limited CO₂ during droughts, low flows, and high water temperatures without photorespiration (Keeley & Rundel 2003). In Florida, *P. repens* became established in over 5,665 ha (14,000 acres) in Lake Okeechobee and changed the structure and composition of the marsh forming a monoculture (Schardt 1994). Seed germination rates are highly variable, but

higher rates were reported for *P. repens* seeds under fluctuating temperatures (Martinez et al. 1992). Based on the current literature, it is unlikely that *P. repens* seeds have high germination rates in the southeastern United States (Wilcut et al. 1988).

The San Marcos River is spring-fed and supports a high diversity of threatened and endangered species including *Z. texana*, *Eurycea rathbuni* Stejneger 1986 (Texas blind salamander), *Eurycea nana* Bishop 1941 (San Marcos salamander), *Etheostoma fonticola* Jordan & Gilbert 1886 (fountain darter), and *Heterelmis comalensis* Bosse, Tuff & Brown 1988 (Comal Springs riffle beetle). An endemic species of fish *Gambusia georgei* Hubbs & Peden 1969 (San Marcos gambusia) once found in the river is thought to be extinct. The upper 7.2 km of the San Marcos River, from the headwaters at Spring Lake to the confluence with the Blanco River, is considered to be one of the most diverse spring runs in Texas and is designated as critical habitat by the United States Fish and Wildlife Service (USFWS 1996). Classification as critical habitat indicates a geographical area has all the attributes needed for long-term success of endangered species' but may require special management and protection measures to ensure species long-term survival. Threats to listed species in the upper San Marcos River include dams, siltation, floods, decreased aquifer levels, low flows, recreation, and non-native species (Terrell et al. 1978; USFWS 1996).

We believe that the similarity in habitat shared by *P. repens* and *Z. texana* is cause for concern. The most upstream population of *P. repens* was observed less than 1 km from critical habitat and ca. 2.3 km from the nearest population of *Z. texana* (Fig. 1). Based on our observations of *P. repens* just below Cumming's Dam, the species exhibits the ability to form monocultures along littoral and riparian habitat, as well as spreading into uplands. This species has the ability to spread into critical habitat occupied by *Z. texana* from accidental or natural movements of small stem fragments, rhizomes, and stolons upstream. In greenhouse studies, small sections of *P. repens* stems with nodes produce roots in 1 day, and 79% of tiller segments and 93% of shoot segments produced new vegetative growth within four weeks (Sartain 2003). *Panicum repens* and *Z. texana* both prefer open sunlight and reproduce vegetatively by rhizomes or tillers. *Zizania texana* is found at a mean water depth of 0.75 m (Poole & Bowles 1999) which lies within the range where *P. repens* is documented to form dense monocultures (Tarver 1979).

The presence of *P. repens* just outside of critical habitat and the possibility that it could be introduced further upstream poses a threat to native species of flora and fauna in the San Marcos River. The establishment of *P. repens* within critical habitat, combined with the effects of other established non-native plants such as *Hydrilla verticillata* (L.f.) Royle (hydrilla), *Hygrophila polysperma* (Roxb.) T. Anderson (East Indian hygrophila), *Cryptocoryne beckettii* Thuill. ex R. Trim (Beckett's water trumpet), and *Colocasia esculenta* (L.) Schott (wild taro) could result in additional habitat loss for *Z. texana*, other native aquatic plants, threatened and endangered species, and alteration of the habitat structure on which they are dependent for survival.

Voucher specimen: **TEXAS. Hays Co.:** San Marcos, San Marcos River (29°51'21"N, 97°54'19"W), ca. 45 m downstream of Cummings Dam on S bank, 0.4 ha in area, riparian and terrestrial, scattered patches downstream, 9 Nov 2012, J. Hutchinson s.n. (TAES). Verified by R. Shaw.

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